GRANT & HACKH'S

CHEMICAL DICTIONARY

[*American, International, European and British Usage*]

Containing the Words Generally Used in Chemistry, and Many of the Terms Used in the Related Sciences of Physics, Medicine, Engineering, Biology, Pharmacy, Astrophysics, Agriculture, Mineralogy, etc.

Based on Recent Scientific Literature

FIFTH EDITION
Completely Revised and Edited by

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The previous edition of this book was *Hackh's Chemical Dictionary*, 4th ed., published by McGraw-Hill in 1969. It was prepared by Dr. Julius Grant from a *Chemical Dictionary* compiled by Ingo W. D. Hackh. The current, or 5th, edition of this book was prepared by Dr. Roger L. Grant, whose father prepared the 4th edition.

The editors for this book were Betty J. Sun and Susan Thomas, the designer was Naomi Auerbach, and the production supervisor was Teresa F. Leaden. It was set in Palatino by University Graphics, Inc.

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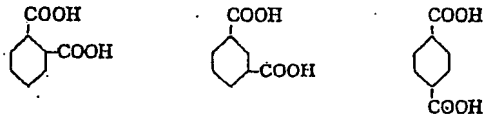
TABLE 24. TYPES, USES, AND PROPERTIES OF ELASTOMERS

Elastomer	Trade names (examples)	Composition and manufacture	Principal uses	Properties
Natural rubber		*cis*-1,4-polyisoprene	Truck tires, off-the-road tires, dipped and proof goods, textile backing, footwear, drug sundries, mechanical goods, latex, foamed products	Abrasion resistance; resilience, good high- and low-temperature performance, tear strength
Homopolymers				
Neoprene (CR)	Perbunan C	Emulsion polymerization of chloroprene (2-chloro-1,3-butadiene)	Mechanical goods, wire coatings, heels and soles	Resistance to oil, ozone, abrasion, solvents
Polybutadiene (BR)	Buna 85, Diene, Philprene-*cis*-4	*cis*-1,4-polybutadiene	Blends with SBR in tires	Abrasion resistance, good oxidation and low-temperature resistance, low hysteresis (low heat buildup)
Polyisoprene (IR)	Coral Rubber, Ameripol SN, Natsyn	Ionic polymerization (in solution) of isoprene	Tires, adhesives, bathing caps, sneaker soles, dipped and proof goods, foamed products, rubber bands	Man-made duplicate of natural rubber
Homo- and copolymers				
Epichlorohydrin	Herclor, Hydrin	Homopolymer is CO type. Copolymer (with ethylene oxide) is ECO type	Gaskets, pump and valve parts, hose, belting	High gas impermeability; good resistance to abrasion, aging, and solvents
Copolymers				
Styrene-butadiene rubber (SBR)	Buna S, Buna Huls	Emulsion polymerization of butadiene with styrene	Tires, heels, soles, foamed products, mechanical goods, wire coatings, floorings	Resilience, tear strength, resistance to high and low temperatures and abrasion
Butyl rubber	Enjay Butyl	Ionic polymerization (in solution) of 2-methyl-2-propene with small amounts of isopropene	Auto motor parts, body mountings, tubes, tire linings, mechanical goods, cable insulation	Shock absorption, sun and ozone resistance; good containment of air; incompatible with other rubbers unless chlorinated
Nitrile rubber (NBR)	Perbunan, Butaprene, Hycar	Emulsion polymerization of butadiene with acrylonitrile	Coated paper, leather and textiles	Oil resistance; resistance to abrasion, ozone, solvents, high and low temperatures; resilience

反応でつくる．合成ゴムおよび合成樹脂の原料として広く使われる．異性体に 1,2-ブタジエン ($CH_3CH=C=CH_2$ mp −136.21°C bp 10.84～10.85 °C d_{20} 0.652) がある．

ブタジエンゴム butadiene rubber ポリブタジエンのうちシス-1,4結合の多いゴム状の物質をいう．BR と略称する．BR の歴史は古く，1930年代にはドイツで Buna という名前で，ブタジエンを金属ナトリウム触媒で重合したものが工業生産されていた．現在では，チグラー触媒を用いた溶液重合によるシス-1,4結合の多い(95% 以上)ステレオ BR と，有機 Li 触媒を用いた溶液重合による低シスタイプ(35% 前後)，乳化重合による BR (シス 10% 以上)が市販されている．ステレオ BR の長所として，ゲル分，灰分が少なく，透明性がよいこと，反発弾性が大きいこと，耐摩耗性，低温特性，耐老化性にすぐれていること，動的用途における内部発熱が小さいことなどがあげられる．一方，欠点としては，コールドフローがあること，汎用ゴムの最大の用途であるタイヤとくに大形タイヤの場合にチッピングなどがあることで，この欠点をカバーするために今日ではスチレン-ブタジエンゴム(SBR)あるいは天然ゴム(NR)と混合して用いることが半ば常識化されている．用途はタイヤ，ベルト，はきもの，工業用品などである．乳化重合による BR は，ステレオ BR の致命的欠点といわれるチッピングがないとされているが，一般的な性質は SBR とステレオ BR の中間といわれる．=BR ⇨ポリブタジエン (530)

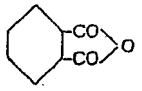
フタル酸 phthalic acid $C_6H_4(COOH)_2$ mw 166.14 芳香族ジカルボン酸のうち最も単純な構造をもつ化合物であるが，つぎの三種の異性体がある．



o-フタル酸　m-フタル酸　p-フタル酸

	mp(°C)	bp(°C)	d
o-フタル酸	191(231)	分解	1.59
m-フタル酸	348.5	昇華	—
p-フタル酸	—	300(昇華点)	

通常 o-フタル酸をフタル酸，m-フタル酸をイソフタル酸，p-フタル酸をテレフタル酸という．o-フタル酸は約 230°C で分解して無水フタル酸になる．



無水フタル酸(mw 148.12 mp 131.8°C bp 285°C d 1.527)は，エステル化反応その他において取り扱いやすいため，通常，o-フタル酸は無水

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PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Etsuko KADOWAKI, et al.

Docket No: Q73675

Appln. No.: 10/540,028

Group Art Unit: 1713

Confirmation No.: 8868

Examiner: Peter D. Mulcahy

Filed: June 22, 2005

For: CURABLE COMPOSITION, CURED PRODUCT THEREOF, MOLDED PRODUCT THEREOF AND USE AS FUEL CELL SEPARATOR

DECLARATION UNDER 37 C.F.R. § 1.132

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I, Tadashi IINO of SHOWA DENKO K.K., 13-9, Shiba Daimon 1-chome, Minato-ku, Tokyo 105-8518 Japan, declare and state:

That I am a research chemist having been awarded a master's degree from the post-graduate course of the Faculty of Industrial Chemistry, the Department of Science and Engineering, Chuo University in March, 1993, and have engaged in research on the application of a conductive polymer for a functional electrode, and

That I have been employed since April, 1993 by SHOWA DENKO K.K., 13-9, Shiba Daimon 1-chome, Minato-ku, Tokyo 105-8518 Japan, and have been engaged in research mainly on:

development of chlorinated polyethylene-based dynamic cross-linking thermoplastic elastomers in the Kawasaki Plastic Laboratory of the same company from May, 1993 to March, 1996;

development of carbon/resin composition in the Kawasaki Plastic Laboratory of the same company from April, 1996 to May, 1999; and

development of separator for fuel cell in the Kawasaki Plastic Laboratory, Corporate R&D Center and Production Technology Center of the same company from June, 1999 up to now.

To demonstrate the unexpected superiority of the present invention, the following experimentation was conducted by me or under my direct supervision.

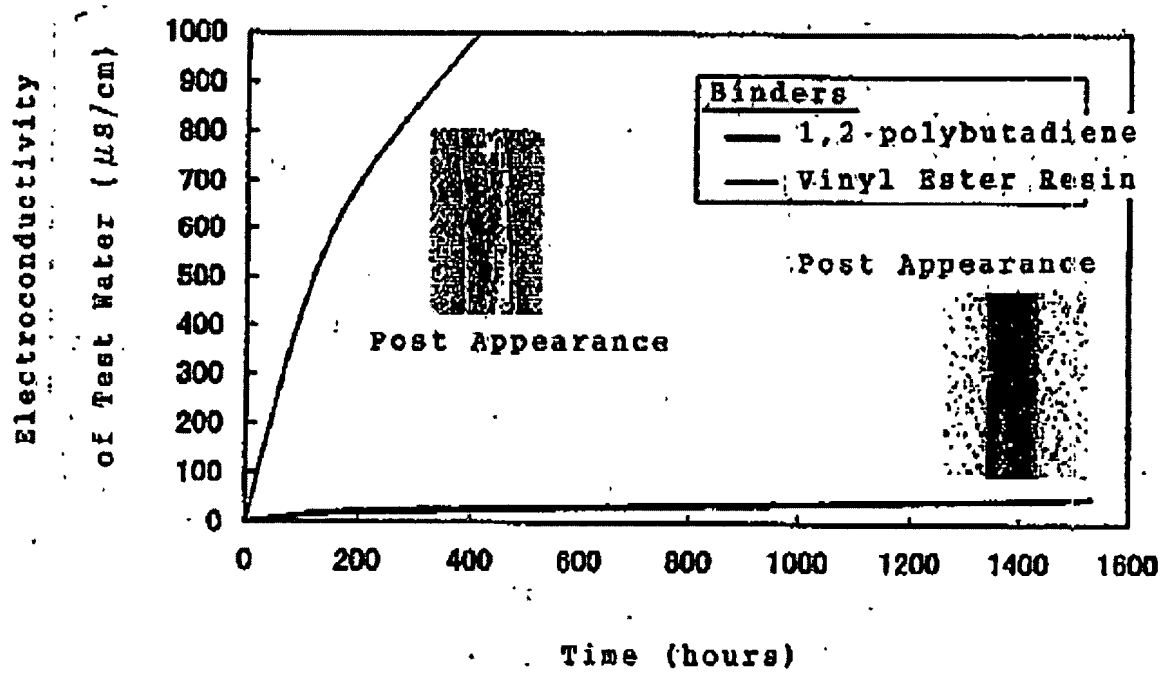
Initially, I note that what might be considered the closest specific embodiment disclosed in Saito involves the use of diallyl phthalate resin (see Example 11 in TABLE 2 of US 6,436,567 B1).

Since diallyl phthalate resin has an ester bond like vinyl ester resin has, it is considered that the hydrothermal (or hot water) resistance (antihydrolyzability) of the curable resin composition comprising diallyl phthalate resin is inferior to that of the curable resin composition comprising 1,2-polybutadiene as in the present invention from the following experimental data, which confirmed the surprising effects of the present invention in comparison with a composition in which vinyl ester resin is used.

In particular, the figure below shows comparative data between 1,2-polybutadiene, which is a diene compound of the present invention, and vinyl ester resin, which has an ester bond like

diallyl phthalate resin has. From the test results, it is concluded that if 1,2-polybutadiene is used in a curable composition, the curable composition can exert excellent hydrothermal (or hot water) resistance in comparison with the composition in which vinyl ester resin is used.

Hydrothermal (or Hot Water) Resistance of Carbon Resin Molded Separators at 150°C (Assessment of Test Water Electroconductivity)



Samples: 4 pieces of 20x20x2mm

4 pieces of 50x10x2mm

Purified water: 60cc

Composition: Graphite/Binder=85.7/14.3wt%

Test Conditions: 60cc of purified water (<10μS/cm) was poured into a pressure-resistant closed container, and the samples (cured products) of the above composition were cut into 4

pieces and then placed into the container. The container was closed and placed in an oven at 150°C, and then the change of electroconductivity of the purified water was measured over time. The measurements of electroconductivity were conducted at room temperature (23°C).

CONCLUSION: Vinyl ester resin was hydrolyzed by hot water and the resultant decomposed ions increased electoconductivity of the water.

Thus, I conclude that the present invention provides unexpectedly superior results.

I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: _____ By: _____
Tadashi IINO